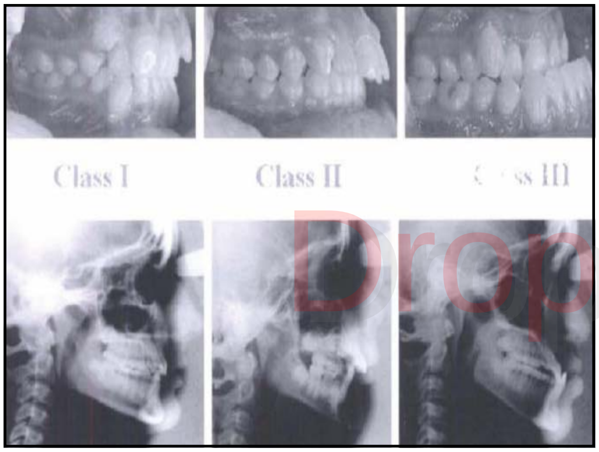
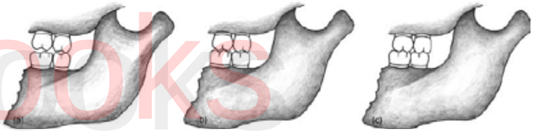
بسم الله الرحمن الرحيم

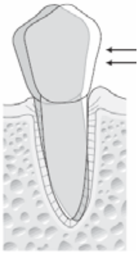
Occlusion and periodontal health

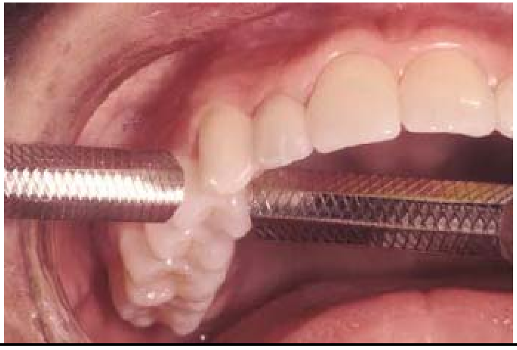




- Healthy periodontal structures and occlusal forces
- Physiology and clinical aspects of tooth mobility
- Tooth mobility
- Types of occlusal forces
- Trauma from occlusion:
  – Primary trauma in healthy non-inflamed periodontium
  – Primary trauma in healthy but reduced periodontal structures
  – Secondary trauma in the progression of periodontitis
- Implants and occlusal trauma
- Gingival recession and occlusal trauma
- Clinical consequence and procedures

TOOTH MOBILITY





Evaluation of tooth mobility

grade 0: physiological mobility

- grade 1: increased mobility but less than 1 mm in total
- grade 2: pronounced increase; more than 1 mm in total
- grade 3: more than 1 mm displacement combined with a displacement in vertical direction (tooth can be intruded).

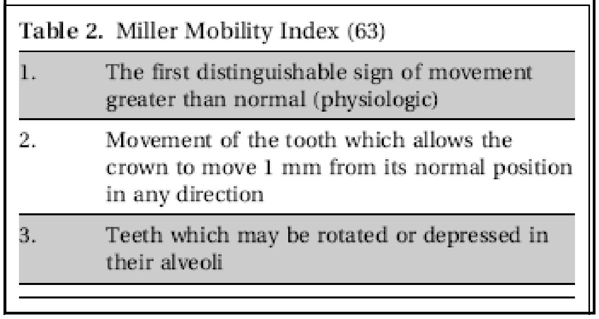
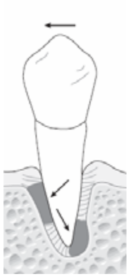
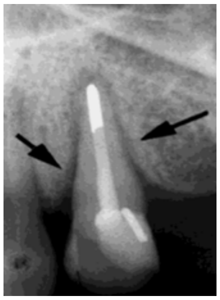


Table 2. Miller Mobility Index (63)

1.	The first distinguishable sign of movement greater than normal (physiologic)
2.	Movement of the tooth which allows the crown to move 1 mm from its normal position in any direction
3.	Teeth which may be rotated or depressed in their alveoli

Aetiological factors of hyper- and hypomobility





TYPES OF OCCLUSAL FORCES

Physiologically normal occlusal forces in chewing and swallowing: small and rarely exceeding 5 N. They provide the positive stimulus to maintaining the periodontium and the alveolar bone in a healthy and functional condition.

- *Impact forces*: mainly high but of short duration. The periodontium can sustain high forces during a short period; however, forces exceeding the viscoelastic buffer capacities of the periodontal ligament will result in fracture of tooth and bone.
- *Continuous forces*: very low forces (for example, orthodontic forces), but continuously applied in one direction are effective in displacing a tooth by remodelling the alveolus.
- *Jiggling forces*: intermittent forces in two different directions (premature contacts on, for example, crowns, fillings) result in widening of the alveolus and in increased mobility

TRAUMA FROM OCCLUSION

Trauma from occlusion has been defined as:

structural and functional changes in the periodontal tissues caused by excessive occlusal forces

Occlusal trauma is the overall process by which *traumatic occlusion* (that is, an occlusion that produces forces that cause injury)

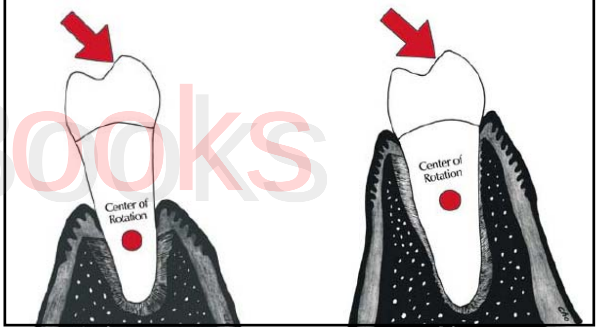
produces injury to the attachment apparatus

Primary occlusal trauma

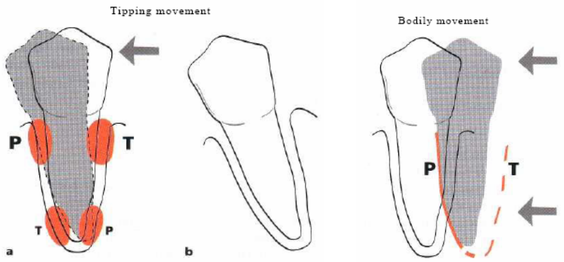
Primary occlusal trauma is caused by excessive and nonphysiological forces exerted on teeth with a normal, healthy and non-inflamed periodontium.

The forces may be exerted on the periodontal structures in one direction (orthodontic forces) or as 'jiggling' forces.

Secondary occlusal trauma   Primary occlusal trauma



Forces in one direction: orthodontic forces



Jiggling forces

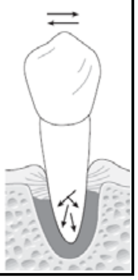
Jiggling forces, coming from different and opposite

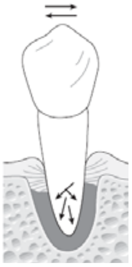
directions, cause more complex histological changes in

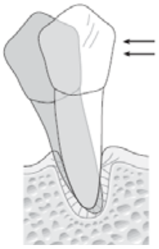
the ligament. Theoretically the same events (hyalinisation,

resorption) occur, however, they are not clearly separated.

There are no distinct zones of pressure and tension.







Secondary occlusal trauma

Secondary trauma from occlusion is defined as the trauma

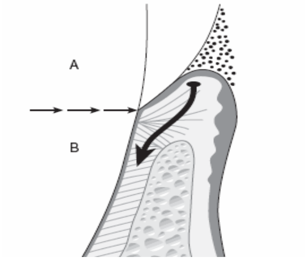
caused by excessive and premature occlusal forces on

teeth with an inflamed periodontium

Glickman
(Glickman & Smulow 1967) formulated the hypothesis that premature contacts and excessive occlusal forces could be a co-factor in the progression of periodontal disease by changing the pathway and spread of inflammation into the deeper periodontal tissues. Glickman hypothesised that the gingival zone was a '*zone for irritation*' by the microbial plaque; the supracrestal fibres were then considered to be a '*zone of co-destruction*' under the influence of a faulty occlusion

---

A zone of irritation
B zone of co-destruction



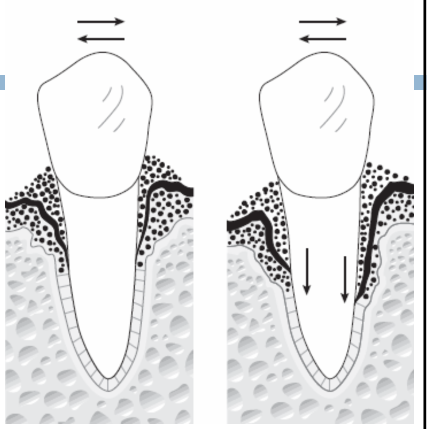
- In the absence of marginal inflammation, jiggling forces do not induce more bone resorption nor a shift of the epithelial attachment in an apical direction.

- In the case of marginal inflammation (gingivitis), occlusal overload has no influence.

- Jiggling forces on teeth with periodontal disease result in more bone loss and more loss of connective tissue attachment

- Jiggling forces induce a faster shift of microbial plaque in the apical direction in the pocket

In applying jiggling forces on an inflamed, untreated periodontium with existing infrabony pockets the bone destruction is accelerated and the bacteria move more apically .



- One single trauma does not influence the pathogenesis; the forces have to be chronic.

- Treatment of periodontal inflammation without elimination of the premature contacts

results in:

decreased tooth mobility,

an increase in bone density,

but no change of bone level.

- After periodontal treatment with scaling and rootplaning,

the presence or absence of prematurities have no influence on the microbial repopulation of the deepened pockets.

- In a healthy non-inflamed dentition, traumatic occlusion leads to hypermobility of some teeth; if hypermobility, radiological widening of periodontal ligament space or pronounced cervical abfraction is found, the occlusion should be analysed and corrected. Simple uncomplicated, non-time-consuming procedures are in most cases adequate to restore a physiological situation and to reduce hypermobility.

- In cases of a healthy but reduced periodontium, increased mobility may also be reduced by occlusal adjustment; it should be recognized that tooth mobility in such cases, based on the mechanical situation, is nevertheless increased. It may be necessary to splint the teeth to increase the functional comfort and to avoid direct fracture. This may include very mobile teeth with a healthy but reduced periodontium, but complicates the clinical procedures.

- In cases of secondary occlusal trauma, treating the inflammation is of primary importance and should be the first step in treatment planning. From the literature it can be concluded that prematurities may play a role in the progression of the periodontitis.

- A simple correction of the occlusion, if necessary, should be included in the initial phase of periodontal treatment.

This results in more gain in attachment level during periodontal treatment, and may contribute to better healing of periodontal tissues.

- There are some indications that removing premature tooth contacts improves the prognosis of periodontally involved tissues.

- If some teeth do not react to conventional periodontal treatment as expected, further investigation should not only include periodontal re-examination and microbiological testing, but also more extensive occlusal analysis.

As implant overload leads to

bone resorption without the warning signal of inflammation,

deep peri-implantitis pockets or (in the early stage) increased mobility,

evaluation of the occlusion and radiographs should be included in regular maintenance programmes.

GINGIVAL TRAUMA FROM OCCLUSION

☐ There is still controversy regarding whether or not overload is an etiological factor in the recession, and consequently whether or not the occlusion and the lateral guidance should be changed.

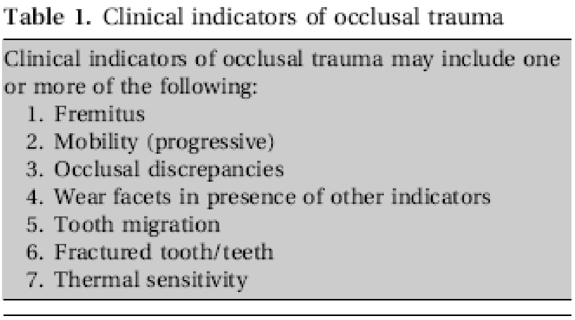
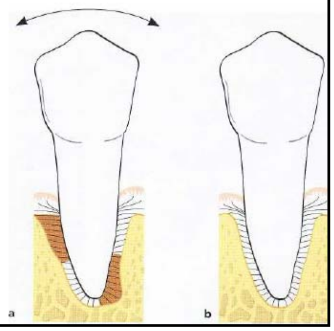


Table 1. Clinical indicators of occlusal trauma

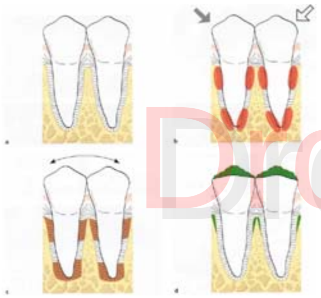
Clinical indicators of occlusal trauma may include one or more of the following:

1. Fremitus
2. Mobility (progressive)
3. Occlusal discrepancies
4. Wear facets in presence of other indicators
5. Tooth migration
6. Fractured tooth/teeth
7. Thermal sensitivity

8. If a tooth with reduced periodontal tissue support (a) has been exposed to excessive horizontal forces, a widened periodontal ligament space ("brown" areas) and increased mobility (arrow) result. Following reduction or elimination of such forces, bone apposition will occur and the tooth will become stabilized (b).



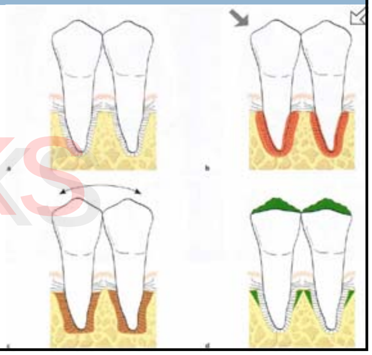
with normal periodontal tissues



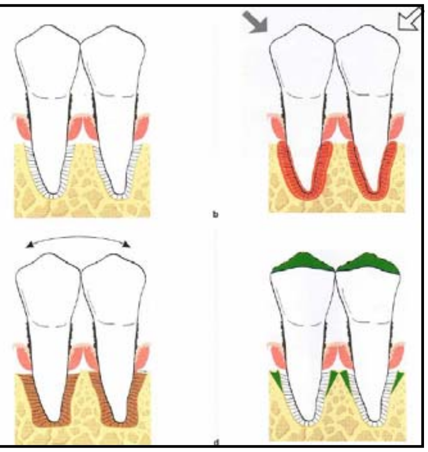
After occlusal adjustment the width of the periodontal ligament becomes normalized

healthy periodontium with reduced height

After occlusal adjustment (d) the width of the periodontal ligament is normalized and the teeth stabilized.



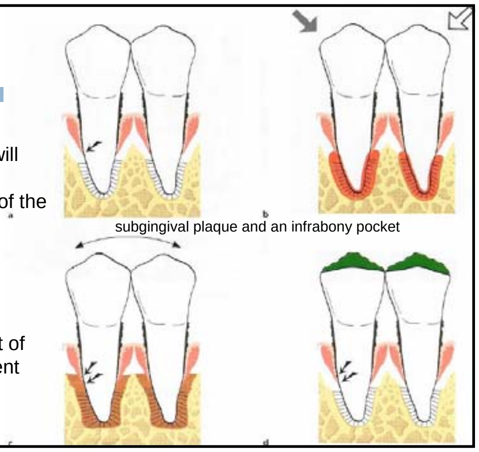
periodontal pockets of a suprabony

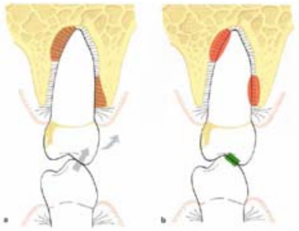


Occlusal adjustment results in a reduction of the width of the periodontal ligament (d) and in less mobile

14. Illustration of a tooth where subgingival plaque has mediated the development of an infiltrated soft tissue (shadowed area) and an infrabony pocket (a). When trauma from occlusion of the jiggling type is inflicted (arrows) on the crown of this tooth (b), the associated pathologic alterations occur within a zone of the periodontium which is also occupied by the inflammatory cell infiltrate (shadowed area). In this situation the increasing tooth mobility may also be associated with an enhanced loss of connective tissue attachment and further downgrowth of dentogingival epithelium; compare arrows in (c) and (d). Occlusal adjustment will result in a narrowing of the periodontal ligament, less tooth mobility, but no improvement of the attachment level (d)

Occlusal adjustment will result in a narrowing of the periodontal ligament, less tooth mobility, but no improvement of the attachment level (d)





TREATMENT OF INCREASED TOOTH MOBILITY

Occlusal adjustment is an effective therapy against increased tooth mobility when such mobility is caused by an increased width of the periodontal ligament.

Increased tooth mobility (or bridge mobility) as a result of reduced height of the alveolar bone

can be accepted and splinting avoided, provided the occlusion is stable (no further migration or further increasing mobility of individual teeth), and provided the degree of existing mobility does not disturb the patient's chewing ability or comfort.

splinting is indicated when the mobility of a tooth or a group of teeth is so increased that chewing ability and/or comfort are disturbed.

Progressive (increasing) mobility of a tooth (teeth) as a result of gradually increasing width of the reduced periodontal ligament

- Splinting is indicated when the periodontal support is so reduced that the mobility of the teeth is progressively increasing, i.e. when a tooth or a group of teeth during function are exposed to extraction forces.

Increased bridge mobility despite splinting In patients with advanced periodontal

An increased mobility of a cross-arch bridge/splint can be accepted provided the mobility does not disturb chewing ability or comfort and the mobility of the splint is not progressively increasing.